



## Worms of the Mississippian Bear Gulch Limestone of central Montana, USA

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*Abstract.* A fauna of worm body fossils representing the phyla Nemertina, Nematoda, and Annelida (some with scolecodonts in place) is described from the Bear Gulch Limestone, uppermost Mississippian (Namurian), of central Montana. Many of the Bear Gulch worms have taxonomic affinities with worm fossils from the Mazon Creek Essex fauna, Upper Pennsylvanian, of Illinois. Some comments on possible paleoecology of Late Paleozoic worms is offered.

### INTRODUCTION

Intact body fossils of worms are rare. The Burgess Shale in the Middle Cambrian of British Columbia has an extensive worm assemblage, originally described by Walcott (1911) and most recently restudied in part by Whittington (1975) and Conway Morris (1977a, 1977b). Størmer (1963) described some Lower Carboniferous nematodes. Schram (1973) described a nemertine and pseudocoelomates from the Upper Pennsylvanian Mazon Creek Essex fauna of Illinois, and Thompson and Johnson (1977), Jones and Thompson (1977), and Thompson (1979) described various coelomate worms from Mazon Creek. The only other fossil nematodes are Tertiary in age and found in amber in association with insects and pieces of arthropod cuticle (Taylor, 1935; Dollfus, 1950). Ehlers (1868) named a eunicid polychaete from the Middle Jurassic Solenhofen Limestone. Polychaetous annelids have been known from the fossil record as scolecodonts, but associated jaw apparatuses are rare (Kielan-Jawarowska, 1966).

Melton (1971) called attention to the unusually preserved fauna of the Mississippian Bear Gulch Limestone as collected from several outcrops in Fergus County, near Beckett, Montana. The fauna contains bony fish (Melton, 1969) and Chondrichthyes (Lund, 1974, 1977a, 1977b; Lund and Zangerl, 1974), a number of invertebrates including conodont animals (Melton and Scott, 1972; Scott, 1973), and various "articulate groups" of which the Crustacea are the most prominent (Schram and Horner, 1978). The fauna is of unusual preservation such that soft bodied animals as well as shell fossils are found in abundance, many of the former representing the worm phyla Nemertina, Nematoda, and Annelida. The worm fossils are preserved as external molds of the body, casts, actual organic remains, and color differences in the rock. This paper described the worm fauna of the Bear Gulch Limestone.

Prefixes to numbers denote specimens from the following collections: UM—University of Montana, Missoula; CM—Carnegie Museum of Natural History, Pittsburgh, Pennsylvania.

### DISCUSSION

The Bear Gulch worms are the second complete fauna of such forms to be described from the Carboniferous. The worms as a whole bear a striking resemblance to the worms of the Middle Pennsylvanian Essex fauna. Schram (1973) described the nemertine and pseudocoelomates of the Essex fauna, and Bear Gulch has specimens

TABLE 1. Relative abundance of worms in the Bear Gulch fauna.

Taxa	Specimens (N)	Worm species (%)
Nemertina		
<i>Archisymplectes rhothou</i>	4	5.4
Nematoda		
<i>Nemavermes mackeei</i>	15	27.0
Annelida		
Phyllodocida		
Goniadidae		
<i>Carbosesostris megaliphagon</i>	7	12.7
Nephtyidae		
<i>Astreptoscolex anasillosus</i>	3	5.4
Eunicida		
Lumbrinereidae		
<i>Phiops aciculorum</i>	4	7.2
Order and family uncertain		
<i>Soris labiosus</i>	2	3.6
<i>Rameses magnus</i>	6	10.9
Phylum uncertain		
<i>Deuteronectanebos papillorum</i>	5	9.1
Unassignable worms	10	18.2

assignable to some of those Essex genera and species, viz., *Archisymplectes rhothou* and *Nemavermes mackeei*. Thompson and Johnson (1977) described the eunicid polychaete *Esconites zelus*, which corresponds to *Phiops aciculorum* at Bear Gulch. Among the 17 species of annelids mentioned by Thompson (1979), one, *Astreptoscolex anasillosus*, is apparently found in both faunas, and another, *Pieckonia helenae*, is closely paralleled by *Carbosesostris megaliphagon* at Bear Gulch. Two Bear Gulch species, *Soris labiosus* and *Rameses magnus*, do not appear to have any ready counterparts in the Mazon Creek Essex annelids described by Thompson. Although much of the Bear Gulch worm fauna (Table 1) is matched by virtually identical or similar forms in the Mazon Creek Essex fauna, the Essex worm fauna is much more diverse, especially in regard to polychaetes.

The mode of preservation between the two assemblages is different as well. The Mazon Creek material is preserved in iron carbonate concretions with superb detail of preservation. For example, Schram (1973) reported cuticular and subcuticular structures in *Priapulites konecniorum*, Thompson and Johnson (1977) recorded gills in *Esconites zelus*, and Thompson (1979) was able to observe detailed setal and acicular structure. The Bear Gulch material is preserved in a fine-grained grey to brown limestone. Preservation in the Bear Gulch Limestone of structures such as jaw apparatuses is equivalent to that of Mazon Creek, but details of purely soft anatomy are not quite as good as that latter fauna. For example, gills, setae, and parapodial details were not observed on the Bear Gulch material.

The correspondence of Bear Gulch worms to Mazon Creek Essex worms remains a striking one, however, and reinforces the similarity between the crustaceans of the two faunas already noted by Schram and Horner (1978). Schram (1979) suggested a nearshore marine chonofauna of invertebrates persisting through most of the Carboniferous of Laurentia. The Bear Gulch fauna roughly marks a midpoint in the range of the chonofauna.

The Bear Gulch worms confirm only some of the paleoecological observations of Thompson (1979) on the Mazon Creek polychaetes (Table 2). First, she commented on the generally "large" size of Mazon Creek polychaetes and this appears to be true for the Bear Gulch forms as well. Second, she documented the predominance of epifaunal predaceous types in the worm assemblage. In the Mazon Creek Essex fauna 59% of the species and 54% of the individuals were epifaunal, and 76% of the species

TABLE 2. Habitat and feeding type of Bear Gulch worms.

Taxa	Habitat	Feeding type
<i>Archisimplyctes rhothon</i>	epifaunal	predator
<i>Nemavermes mackeei</i>	epifaunal	predator
<i>Astreptoscolex anasillosus</i>	epifaunal	predator
<i>Carbosesostris megaliphagon</i>	infaunal	predator
<i>Phiops acicolorum</i>	?	predator
<i>Soris labiosus</i>	?	?
<i>Ramesses magnus</i>	?	?
<i>Deuteronectanebos papillorum</i>	?	?

and 96% of the individuals were predator-scavenger types. The Bear Gulch worm fauna is not as diverse as the Essex fauna and some species are difficult to assign to habitat and feeding type, but the importance of epifaunal habit (Table 3) and predominance of predaceous life style (Table 4) is generally upheld.

Thompson compared her fossil biotas with similar data derived from Parker (1956) on Mississippi delta polychaetes, where 61% of the species were predaceous, and from Day et al. (1971) on the North Carolina coast, where 29% of individuals were predaceous. Thompson's comparisons are of limited value, however, because they deal with contemporary temperate faunas (not all deltaic), whereas contemporary tropical deltaic faunas would have perhaps been more appropriate. Parker (1956) actually deals with species from 7 distinct environments of varying sediment types collected from 280 biological stations and 130 geological cores.

Thompson concluded that the epifaunal predominance in the Essex fauna was due to the large influx of migrating adult forms (epifauna) into a small area. This area had limited access to the open sea with freshwater inflow causing salinity fluctuations. She postulates such conditions did not favor survival of migrating larval types. The issue of predator dominance is left fallow by Thompson. But current understanding of regional Mazon Creek paleogeography (Shabica, 1979; Baird, 1979) would not seem to bear out her migrating-adult explanation. Nor is such an explanation perhaps applicable to Bear Gulch. Furthermore, the migratory abilities of adult errantians is limited, dispersal in all polychaetes being generally achieved by larvae. Nor do salinity fluctuations act as real long-term barriers to many polychaete forms, because Oglesby (1969) points out that all polychaetes and sipunculids investigated are osmotic conformers or develop physiologic adaptations to handle changing salt balance. Smith (1955) pointed out that at least for *Nereis diversicolor*, ability to spread into fresher water was more related to the length of the larval stages of a particular population rather than salinity intolerance. Thus Thompson's explanation for peculiarities in the nature of Mazon Creek polychaete assemblage is perhaps needlessly complicated and not in accord with what we know about living polychaete biology.

There still remains the problem of explaining the dominance of epifaunal predator-scavenger worms in these faunas. The fact that this is so for both Mazon Creek and Bear Gulch suggests that perhaps this was a distinctive yet normal feature of the Carboniferous nearshore marine chironofauna of Laurentia. Any attempt to use preservational anomalies to explain this dominance must remain weak because both sites are Konservat-Lagerstätten (Seilacher, 1970). The circumstances of burial and fossilization mitigated to preserve the entire autochthonous fauna of those times and places

TABLE 3. Breakdown of habitat preferences of Bear Gulch worms.

Habitat	Species (%)	Specimens (%)
Epifaunal	37.5	38.2
Infaunal	12.5	12.7
Unknown	50.0	49.1

TABLE 4. Breakdown of feeding type preferences of Bear Gulch worms. Feeding types taken from Thompson (1979) and included for comparison.

Feeding type	Species (%)	Specimens (%)
Predator	62.5	58.2
Selective deposit feeder	...	...
Nonselective deposit feeder	...	...
Suspension feeder	...	...
Unknown	37.5	41.8

essentially intact. Thus the species of worms and their relative proportions in the biotas of these localities are probably fairly close to those of the original state.

The answer as to why this peculiar epifaunal predator-scavenger dominance existed in the Carboniferous nearshore marine chronofauna lies with further study and more complete understanding of the early history and origin of the nearshore marine chronofauna in the Late Devonian–Early Carboniferous. Certainly the chronofauna as such does not lack for epi- and infaunal suspension and deposit feeders. The Bear Gulch fauna has, besides some crustaceans of these types (Schram and Horner, 1978), brachiopods, pelecypods, and sponges (these last at least in the lowermost beds of the Bear Gulch Limestone). The more diverse Mazon Creek fauna has pelecypods, inarticulate brachiopods, a problematic hemichordate *Etacystis communis* (Nitecki and Schram, 1976), as well as some filter feeding crustaceans (Schram, 1979). These would have effectively augmented those few epi- and infaunal suspension and deposit feeding annelids Thompson (1979) did note.

The evidence of the overall faunal constitution and preservational nature seems to indicate that the predominance of epifaunal predaceous-scavengers in the worm contingent of the Laurentian Carboniferous nearshore marine chronofauna is a real one, distinctive to that period of time and related to the circumstances existing then.

#### SYSTEMATIC PALEONTOLOGY

##### Phylum Nemertina

##### Genus *Archisymplectes* Schram, 1973

##### Type species *Archisymplectes rhothon* Schram, 1973

##### *Archisymplectes rhothon* Schram, 1973

##### Fig. 1b

*Material*.—UM 5546, 6485; CM 33941, 33942.

*Remarks*.—These specimens preserve the familiar twisted and knotted form so characteristic of "ribbon worms" (Fig. 1b). As in the Mazon Creek Essex fauna species, *A. rhothon*, very little external anatomy is preserved on so relatively simple an animal as a nemertine. Conway Morris (1977a) agrees, however, that *A. rhothon* is probably a nemertine. Consequently, there is really very little to distinguish these Bear Gulch forms from those of Illinois, and the Montana specimens are placed in the same species of the latter. (Modern nemertine taxonomy is based on histology of the body wall and brain location, information not available in fossils.)

##### Phylum Nematoda

##### Genus *Nemavermes* Schram, 1973

##### Type species *Nemavermes mackeei* Schram, 1973

##### *Nemavermes mackeei* Schram, 1973

##### Fig. 1a

*Material*.—UM 5554, 5562, 5564, 5569, 5570, 5875; CM 33990, 33993 (≈9 individuals).

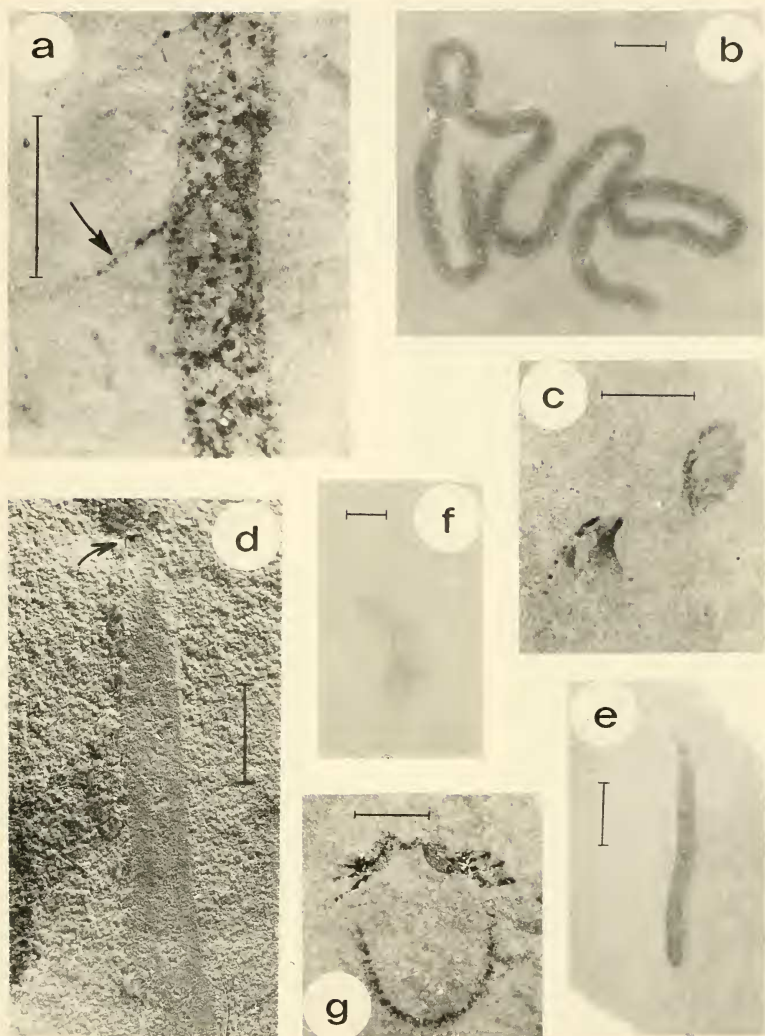


FIG. 1. a. *Nemavermes mackeei* Schram, 1973, UM 5554 with hair or seta (arrow), scale 5 mm; b. *Archisymplectes rhoton* Schram, 1973, CM 33941, scale 5 mm; c, d. *Soris labiosus* gen. et sp. nov., UM 5548, with paired jaws and lips, scale 1 mm in c, 1 cm in d (arrow indicates jaws); e. Unnamed shape resembling a nematode, scale 5 mm; f. UM 5557, unnamed shape resembling a sipunculid, scale 5 mm; g. *Carbosesostis megaliphagon* gen. et sp. nov., UM 5542, closeup of jaw apparatus, scale 1 mm.

*Remarks.*—Several specimens have been identified which possess a nematode-like body, and preserve fine hairs or setae-like structures (UM 5554) on the cuticle (Fig. 1a). These are virtually identical to the Essex fauna species *N. mackeei*. With so little anatomy to analyze it seems best to assign these Bear Gulch fossils to the Illinois species.

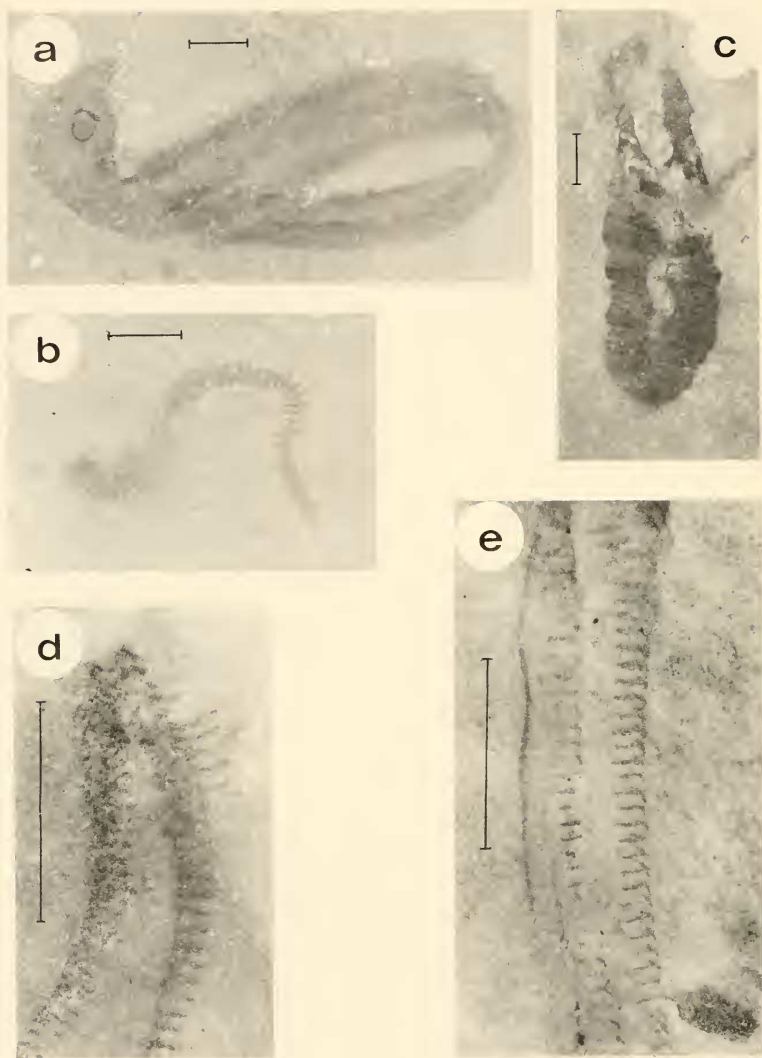


FIG. 2. a. *Carboesostris megaliphagon*, gen. et sp. nov., UM 5542, scale 5 mm; b, c. Unnamed worms: b, CM 33939, probably polychaete, scale 5 mm, c, CM 33943, part of a segmented worm, scale 5 mm; d, e. *Ramesses magnus* gen. et sp. nov.: d, UM 5552, terminal end showing longer setae, scale 5 mm, e, UM 5553, midbody showing acicula along ventral surface, scale 5 mm.

Phylum Annelida  
 Class Polychaeta  
 Order Pyllodocida  
 Family Goniadidae  
 Genus *Carboesostris* gen. nov.

*Diagnosis.*—The diagnosis of the genus is the same as that of the species.

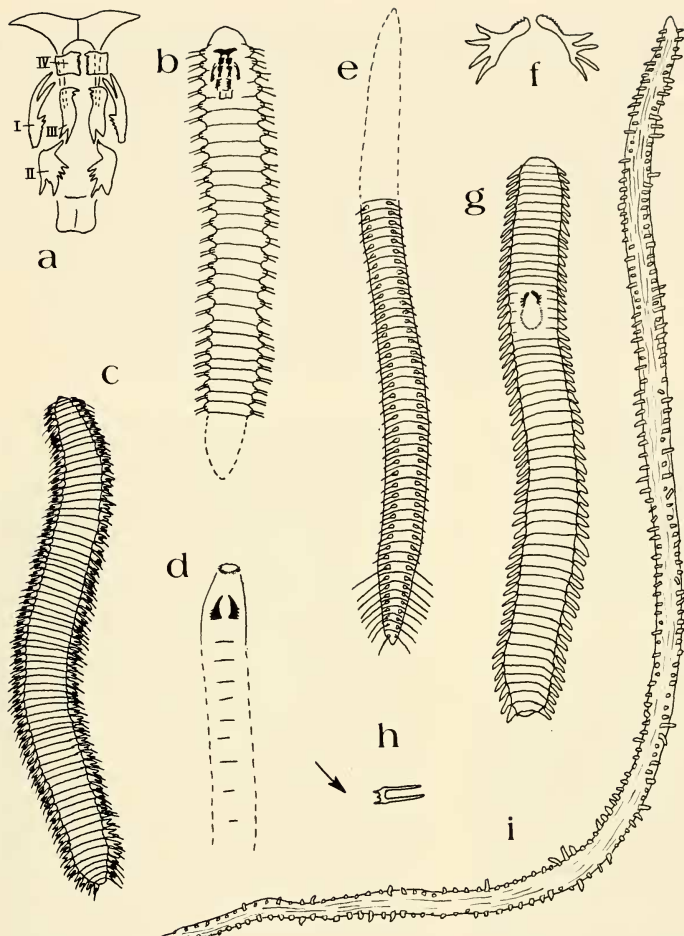


FIG. 3. Reconstruction of Bear Gulch worms. a. Jaw apparatus of *Phiops aciculorum*, with maxillae numbered; b. *Phiops aciculorum*; c. *Astreptoscolex anasillosus*; d. *Soris labiosus*; e. *Ramesses magnus*; f. Paired macrognaths of *Carboesostris megaliphagon*; g. *Carboesostris megaliphagon*; h. A micrognath element of *Carboesostris megaliphagon*, arrow indicating inner edge of ring; i. *Deuteronectanebos papilorum*.

*Etymology*.—Name derived from the age of the fossils and after a series of XIIIth dynasty pharaohs from the Greek kings list of the Ptolemaic historian, Manetho.

*Carboesostris megaliphagon* sp. nov.

Fig. 1g; Fig. 2a; Fig. 3f, g, h

*Diagnosis*.—One pair of complex macrognaths; 30–40 “H”-shaped micrognaths in a ring; body long with apparently uniramous parapodia without acicula.

*Holotype*.—UM 5542 (Fig. 2a).

*Type locality*.—As described in the INTRODUCTION.

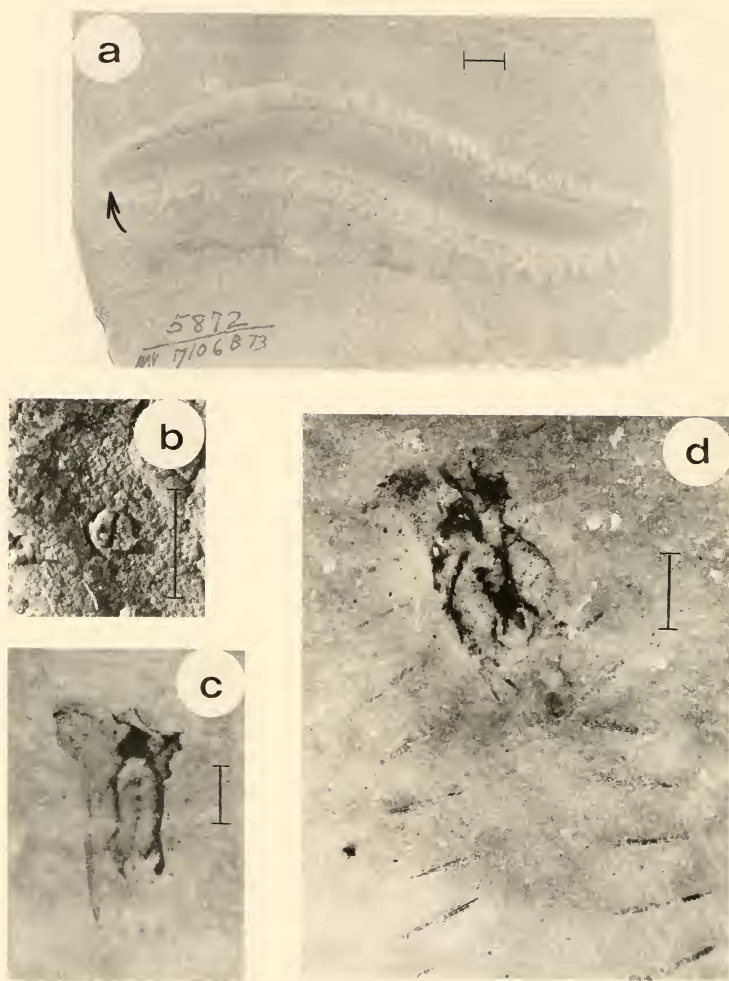


FIG. 4. a, b. *Astreptoscolex anasillosus* UM 5872, scale 5 mm in a, scale 1 mm in b; c, d. *Phiops aciculorum* gen. et sp. nov., UM 5543: c. CM 33945, closeup of jaw apparatus, scale 1 mm, d, head end with jaw apparatus and anterior acicula, scale 1 mm.

*Etymology.*—A reference to the magnificent jaw apparatus.

*Material.*—UM 5542, 5871, 6355 (3 individuals); CM 33988, 33989.

*Description.*—The macrognaths are 1–2 mm long and composed of 2 portions (Fig. 3f); a posterior region with 4 large denticles widely spaced in a fan-like arrangement, and an anterior region composed of a serrate blade (best preserved on UM 5542 [Fig. 1g] and UM 5871). The micrognaths number 30 to 40 and are arranged in an open ring posterior to the macrognaths. The micrognaths (Fig. 3h) are “H”-shaped, with the uprights facing the outside of the ring very long making the individual elements almost “U”-shaped; the crossbar of the “H” has an inwardly directed spine. The body of the



animal is between 6 to 9 cm long, clearly segmented, and adorned with apparently simple uniramous, short parapodia (UM 6355) with no setae or acicula visible. The segments occur at a rate of 8 every 10 cm.

*Remarks.*—*Carbosesostris megaliphagon* is the most abundant of the Bear Gulch polychaetes and is related to a known living group. A large macrognath and the micrognath ring place it in the family Goniadidae. Thompson (1979) described a goniadid, *Pieckonia helenae*, which possessed a distinctive set of "chair-shaped" micrognaths, with 2 pronged roots and 4 pronged teeth, and no macrognaths. The distinctive differences in micrognaths between *P. helenae* and *C. megaliphagon*, and the presence of macrognaths in the latter, justify the erection of a separate genus and species for the Bear Gulch material. A reconstruction of *Carbosesostris megaliphagon* is offered in Fig. 3g.

#### Family Nephtyiidae

Genus *Astreptoscolex* Thompson, 1979

Type species *Astreptoscolex anasillosus* Thompson, 1979

*Astreptoscolex anasillosus* Thompson, 1979

Fig. 4a, b; Fig. 3c

*Material.*—UM 5872, 5874, 5876.

*Remarks.*—The species is rare in the fauna and only 2 specimens have been definitively assigned to the species (UM 5872 and 5876) along with a questionable third (UM 5874). The body is large and fleshy (UM 5872 is just over 9 cm long and  $\approx$ 1 cm at its widest, with about 74 segments). The segments are all well demarcated and possess large biramous parapodia. Several of the parapodia bear acicula which appear to have been somewhat flexible because some of them are bowed or curved. The anterior end of the animal is blunt and the posterior end somewhat tapered. Both good specimens have some organic remains which mark the gut and UM 5872 has pellets in the gut. UM 5872 also has what appear to be molds of a small set of jaws (Fig. 4b).

Although *Astreptoscolex* is the best preserved of the Bear Gulch polychaetes, the assignment to the family Nephtyiidae must retain some query. The general form of the body and the apparent presence of a simple jaw apparatus suggests this family, but lack of better preservation of the prostomium, palp, and tentacle structures makes the family assignment less secure than I would like. The only other family this body form might suggest would be the Nereidae, but the nereids have paragnaths and large jaws in the proboscis. A reconstruction of the Bear Gulch *Astreptoscolex* is offered in Fig. 3c and closely resembles that of Thompson (1979).

#### Order Eunicida

Family Lumbrinereidae

Genus *Phiops* gen. nov.

*Diagnosis.*—The diagnosis of the genus is the same as that of the species.

*Etymology.*—Named after the VIth dynasty pharaoh, Pepi II, from the Greek kings list of the Ptolemaic historian, Manetho.

*Phiops aciculorum* sp. nov.

Fig. 3a, b; Fig. 4c, d; Fig. 5a

*Diagnosis.*—Complex jaw apparatus with mandible and at least 4 pairs of maxillae on each side; mandible with pointed lateral wing; maxilla I (forceps) anteriorly developed as 2 large denticles, maxillae II–IV multidentate through most of their lengths; large acicula on parapodia.

*Holotype.*—UM 5543 (Fig. 4d).

*Type locality.*—As described in the INTRODUCTION.

*Etymology.*—A reference to the prominent acicula.

*Material.*—UM 5543, 5873; CM 33944, 33945.

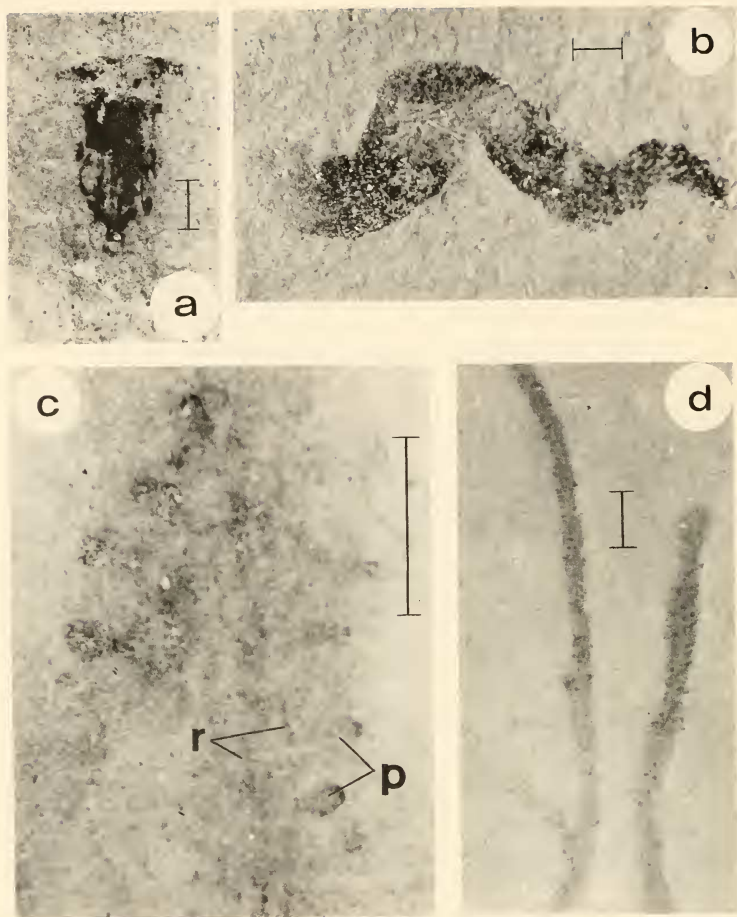


FIG. 5. a. *Phiops aciculorum*, CM 33945, closeup of jaw apparatus, scale 1 mm; b. Unnamed shape resembling a nematode, UM 5556, scale 1 mm; c, d. *Deuteronectanebos papillorum*, gen. et sp. nov., UM 5545: c, (r) longitudinal striations, (p) papillations, scale 5 mm; d, worm doubled back on itself off the edge of the slab, scale 5 mm.

*Description.*—The best specimen, UM 5543, has the jaw apparatus moderately well preserved on the left side, but somewhat less so on the right (Fig. 4d). CM 33944 and CM 33945 also preserve almost complete sets of jaws. The mandibles are fan-shaped, markedly pointed laterally (Fig. 5a), and appear to have been fused at the midline. There are at least 4 pairs of maxillae. Maxilla I (forceps) has 2 long denticles directed anteriorly from a serrated posterior region. Maxilla II has several large denticles in a fan-like arrangement with the denticles at either end of the series distinct from the center 5 (Fig. 4d). Maxilla III is developed as a long sigmoid blade with serrations on the anterior end (Fig. 4c). Maxilla IV is square-shaped with a serrated cutting margin (Fig. 4c, d). The carriers, though not well preserved, are short and broad (Fig. 3a).

The acicula are large and thick with longitudinal striations. There appear to have been 2 per parapodium. The parapodia themselves were lobate (UM 5873). The holotype (UM 5543) has at least 27 segments preserved, but the animal is missing the posterior end.

*Remarks.*—The complex jaw apparatus clearly marks *Phiops* as a eunicidan. The short carriers and paired elements along the whole series indicate a lumbrinereid. Eunicids have asymmetrical maxillae; arabellids and lysaretids would have long slender carriers; and dorvilleids would have the maxillary elements developed as numerous pieces in a long series. The serration pattern on the jaw elements of *Phiops* is clearly unlike anything Kielan-Jawarowska (1966) describes in her monographic treatment of intact jaw apparatuses.

A partial reconstruction of *Phiops aciculorum* is given in Fig. 3b.

Order *incerta sedis*  
Genus *Soris* gen. nov.

*Diagnosis.*—The diagnosis of the genus is the same as that of the species.

*Etymology.*—Named after the founder of the IVth dynasty. Pharaoh Snofru, as taken from the Greek kings list of the Ptolemaic historian, Manetho.

*Soris labiosus* sp. nov.  
Fig. 1c, d; Fig. 3d

*Diagnosis.*—Jaw a narrow falx; no denticles on the inner margin; some indication of faint serrations on the outer margin; prominent lips.

*Holotype.*—UM 5548 (Fig. 1c, d).

*Type locality.*—As described in the INTRODUCTION.

*Material.*—UM 5548, 5549.

*Description.*—The jaws on the holotype are  $\approx 1$  mm long and what has been preserved of the body is  $\approx 5$  cm (posterior end missing). The jaws are simple scimitars, having a single narrow falx arising from a nondenticulated base. There is some slight indication that the outer margin of the jaws may have been serrate. Anterior to the jaws on UM 5548 is a dark ring (possibly the remnants of the lips of the proboscis). The ring does not display any structure under high power, thus suggesting it represents preservation of dense organic tissue rather than any ring of jaw elements.

The body itself is only incompletely preserved on the holotype and hardly at all on UM 5549. The posterior terminus is missing. No parapodia can be seen. Only faintly delineated somite boundaries can be discerned.

*Remarks.*—Sufficient soft anatomy has not been preserved in *Soris* to be able to refer it to an order. The jaws alone are not sufficient to do so. There is some slight resemblance of the jaws of *S. labiosus* to the scolecodont genera *Glycerites* Hinde, 1879, and *Paraglycerites* and *Paranereites* Eisenack, 1939. But the relatively straight posterior margin and the apparent lack of a prominent myocoel opening at the base serves to separate *Soris* from these other genera.

Conway Morris (personal communication) has noted a *Soris*-like jaw in the gut of one of the "conodont-eating" animals.

A partial reconstruction of *Soris labiosus* is offered in Fig. 3d.

Genus *Ramesses* gen. nov.

*Diagnosis.*—The diagnosis of the genus is the same as that of the species.

*Etymology.*—Named after the series of XIXth and XXth dynasty pharaohs.

*Ramesses magnus* sp. nov.  
Fig. 2d, e; Fig. 3f

*Diagnosis.*—Short body segments; short, stout parapodia with thick short acicula; terminus of body with parapodia armed with thick long setae.

*Holotype*.—UM 5552 (Fig. 2d).

*Type locality*.—As described in the INTRODUCTION.

*Etymology*.—After the great XIXth dynasty pharaoh, Ramesses II.

*Material*.—UM 5550–5553, 5560, 5877.

*Description*.—The body is very long and narrow. But the length is indeterminate since only one specimen (UM 5877) is anything approaching a complete animal, the two termini poorly preserved on one counterpart and only one preserved at all on the other. The body is composed of short somites (UM 5552) with the aciculate parapodia located along one surface (UM 5553; Fig. 2e). The aciculae are single, stout, and short. At one terminus (possibly the posterior), the last 8 to 10 segments have parapodia with long setae.

*Remarks*.—All the specimens at hand are best studied under water to bring out the details of preservation.

In some respects, the body form of *Ramesses*, with its short segments and short, stout parapods along one surface is similar in some respects to the modern polychaete family Orbiniidae. But without better information about the terminal ends, a definitive placement of *Ramesses* within a family cannot be undertaken.

A partial reconstruction of *Ramesses magnus* is offered in Fig. 3e.

#### Phylum uncertain

#### Genus *Deuteronectanebos* gen. nov.

*Diagnosis*.—The diagnosis of the genus is the same as that of the species.

*Etymology*.—Named after the XXXth dynasty and last native pharaoh, Nectanebo II, from the Greek kings list of the Ptolemaic historian, Manetho.

#### *Deuteronectanebos papillorum* sp. nov.

Fig. 5c, d; Fig. 3i

*Diagnosis*.—Body long and narrow; cuticle marked with faint longitudinal striations and prominent papillations.

*Holotype*.—UM 5545 (Fig. 5d).

*Type locality*.—As described in the INTRODUCTION.

*Etymology*.—A reference to the prominent papillae.

*Material*.—UM 5544–5546, 5561, 5819.

*Description*.—The specimens at hand range from 4 to 25 cm in length. The body is marked along its length by prominent papillations (Fig. 5c). In addition, longitudinal striations are noted and are best preserved on UM 5545. The body is narrow and tapered at what appears to be its posterior end. No jaws, cirri, or palps are noted on any of the specimens.

*Remarks*.—Though the diagnostic papillated and striated surface of *Deuteronectanebos* is very striking, the assignment to phylum must be uncertain. The order Capitellida in the annelids is suggested by the resemblance of *Deuteronectanebos* to certain living forms as illustrated by Hartman (1947). But the similarity is inconclusive.

The possibility of this rather nondescript species not being animal has been considered. A possible algal affinity is suggested, but Dr. Matthew Nitecki, Field Museum, examined the specimens and concluded (personal communication) they were not algal.

#### Genera and species uncertain

Several specimens were found in the Bear Gulch material which should not be named because of their poor preservation and paucity of material. Some of the more intriguing specimens are illustrated here. One can only speculate as to what they might be: e.g., UM 5557 (Fig. 1f) suggests the form of a sipunculid; CM 33939 (Fig. 2b) is obviously some type of polychaete; and CM 33943 (Fig. 1e) may be some type of segmented worm. UM 5555 (Plate 1, Fig. 5) and UM 5556 (Fig. 5b) resemble nematodes and may be synonymous with *Nemavermes*. In addition, there are numerous speci-

mens which can only be characterized as "vermoid." The material itself is such poor quality, however, that one cannot really be sure whether some of these are real organic remains or just some preservational or sedimentary artifacts.

#### ACKNOWLEDGMENTS

Thanks must be extended to W. Melton, University of Montana; Richard Lund, Adelphi University; and John Carter, Carnegie Museum, for the loan of material to study. Photographic work was done by Dan Stephenson.

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